Space Weather Forecast

Issued on Sunday, 19 November 2023 at 13:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Increasing chance of Moderate flares and R1/Minor Radio Blackoutsts. Chance of G1/Minor Geomagnetic activity peaking Day 2 and a further risk Day 4.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been moderate over the past 24 hours, with the background level X-ray flux recorded at GOES16 at low Common-class levels throughout. The largest flare was a low-end impulsive Moderate-class at 18/1644UTC, with a second similar flare observed at 18/2234UTC. These flares appear to have emanated from a large region which is becoming visible on the northeastern limb and which may form part of the wider sunspot region in the northeast.

There are three sunspot regions on the Earth-facing disc, with a fourth having rotated beyond the western limb earlier in the 24 hour period. The southeastern group showed strong growth and proliferation of intermediate penumbral spots and is . To the northeast, an arriving region shows a large north-south span, and may yet be split into several groups, but is likely to become the most complex of the two groups when fully observable.

There have been numerous Coronal Mass Ejections (CMEs) observed on imagery over the last 24 hours, with the region narrowly behind the northeastern limb responsible for a large proportion of these, although no effects are expected to be felt at Earth. A CME was observed to the southeast on LASCO imagery around 19/0200 UTC and is attributed to a prominence eruption, seen lifting off on AI-A304 around 19/0100 UTC. This was followed by a small filament lift-off from the southeast disc around 19/0200UTC. A slow ejection was also observed just beyond the northwest limb around 19/0300 UTC, but appears to have been largely reabsorbed. Although no Earth-directed components are expected from these recent CMEs, we are currently awaiting the output from Enlil modelling.

Solar Wind / Geomagnetic Activity: Solar winds, as measured by ACE and DSCOVR at L1, have remained at slow-ambient levels but have risen slightly since midnight and are now around 350 km/s. The interplanetary magnetic field (IMF) has been weak and the important north-south direction weakly fluctuated. The net result of the above solar wind measures was for Quiet (Kp 0-2) geomagnetic activity throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Solar activity is expected to remain Moderate through the period, with continued risk of further isolated Moderate flares. These are most likely to come from regions presently just beyond the northeastern limb that are expected to rotate onto the visible disc in the coming days.

Solar Wind / Geomagnetic Activity: There is one Coronal Mass Ejection (CME) that currently features in the forecast - the central filament eruption from 16/0100 UTC. This is due either late

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Day 1 (19 Nov) or more likely in the UTC morning of Day 2 (20 Nov) with an associated slight chance of a G1/Minor Geomagnetic Storm. Activity is expected to otherwise be mostly Quiet to Unsettled (Kp 0-3) until the anticipated onset of a stream of fast winds from a coronal hole on Day 4 (22 Nov) which may see a greater chance of generating a G1/Minor Geomagnetic Storm.

Solar winds are expected to remain initially at or close to slow-ambient levels, with brief enhancement following the CME arrival late Day 1 or Day 2. A more significant increase is expected Day 4 following the onset coronal hole fast winds, with winds increasing to a speed of 500 km/s or more.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	20	5	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	50	50	50
Very Active	R3 to R5 X	No	1	1	1	1

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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